CALIFORNIA ENERGY COMMISSION

Increasing Water and Energy Efficiency to Meet Future Needs

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Technical Workshop on Efficiency, Renewables, and Grid Management

August 19-21, 2015

UC San Diego

Overview

- California's Drought Response
- Water Energy Technology Program (WET)
- Water and Energy Efficiency Research Activities
- Upcoming Events

Drought Response

- In response to California's ongoing drought, Governor Brown directed the first ever statewide mandatory water reductions. (Exec. Order B-29-15)
- The Governor directed the Energy Commission to implement a water energy technology (WET) program as part of its work to address the drought.
- Other drought-related work at the Energy Commission
  - Standards to improve water appliances efficiency.
  - Expedited processing of applications for alternate water supply for power plant operation.
  - Water appliance rebate program.

http://www.energy.ca.gov/drought/

CALIFORNIA'S DROUGHT TECHNOLOGY PROGRAM

INVESTING IN INNOVATIVE WATER & ENERGY SAVING TECHNOLOGIES

LAUNCHING FALL 2015

Water Energy Technology (WET) Program*

Accelerating deployment of innovative technologies that meet the following criteria:

- Display significant greenhouse gas emission reductions and water and energy savings.
- Demonstrate actual operation beyond the research and development stage.
- Documented readiness for rapid, large-scale deployment in California.
- Technologies must be commercially available.

* Contingent on Legislative approval of funding.

Proposed Funding from California Climate Investments Program

Phase 1: $10 million for Agriculture Rebates and Grants

Phase 2: $16 million for Industrial, Commercial, and Residential Grants

Phase 3: $3 million Desalination Grants

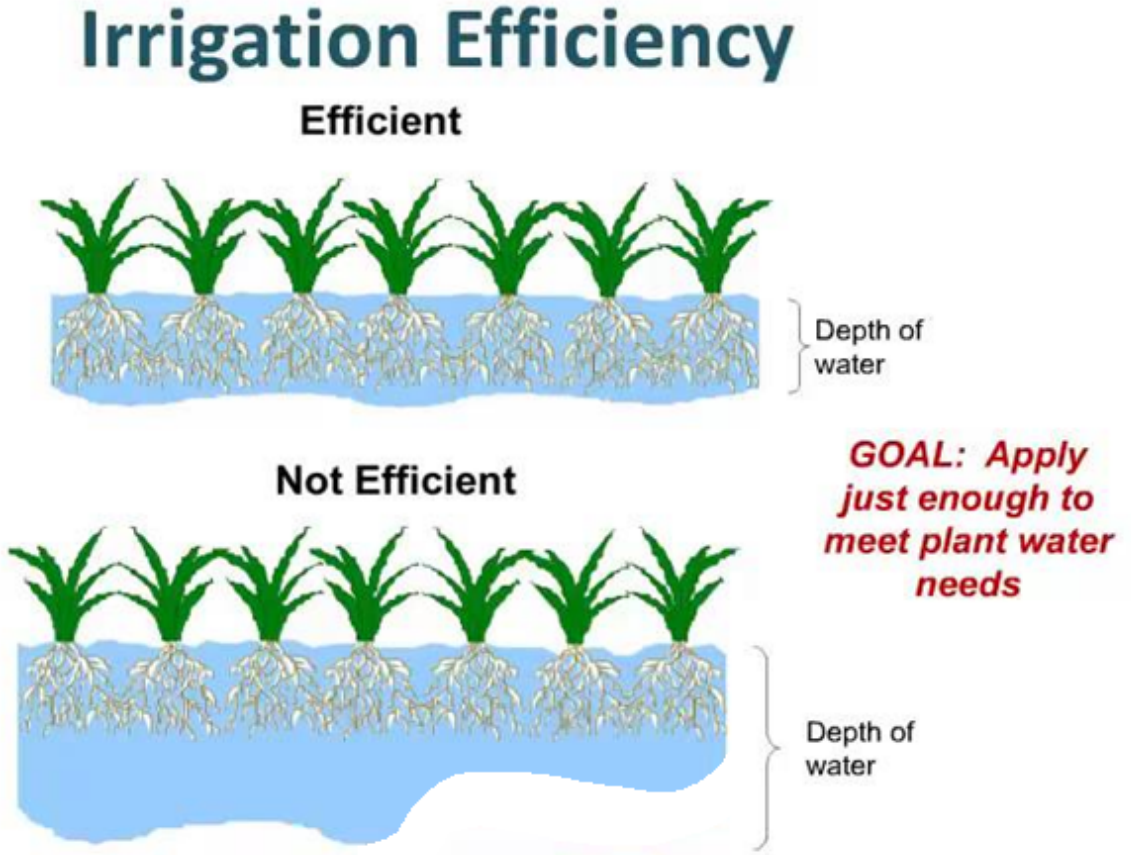
Please visit our webpage for more information:
http://www.energy.ca.gov/wet/

WET Agriculture Rebate:
Water Savings – Distribution Uniformity

Irrigation System

- Irrigation Designer
- High performing equipment
- Maintenance
- High distribution uniformity

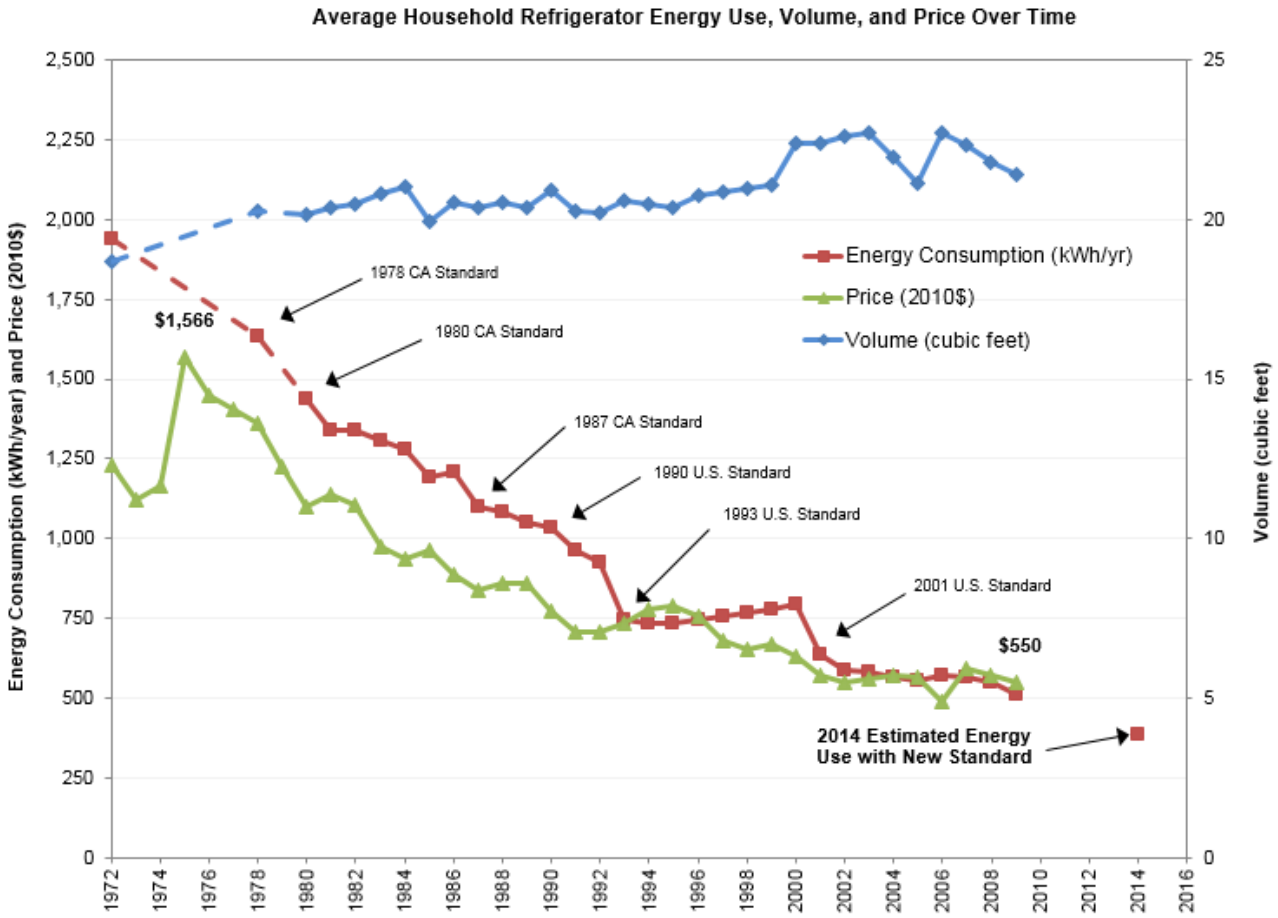
11% savings in water use by improving DU through proper water treatment and maintenance plan (Savings may vary on a per project basis)



WET
Phase 1, 2 and 3 Grants

- **Agriculture** (Phase 1): Custom innovative projects associated with irrigation on agricultural operations with on-site energy and water savings
- **Commercial, residential, and industrial** (Phase 2): Innovative waterless or reduced water using technologies; industrial and food service process improvements that reduce both energy and water
- **Desalination** (Phase 3): Improvements to existing plants that result in reduction of energy use while increasing water production, e.g. use of high efficiency, advanced membranes.

Standards Have Spurred Innovation in Energy: What will Advance Innovation in Water?



Sources: NRDC, Appliance Standards Awareness Project, Association of Home Appliance Manufacturers, U.S. Census Bureau.

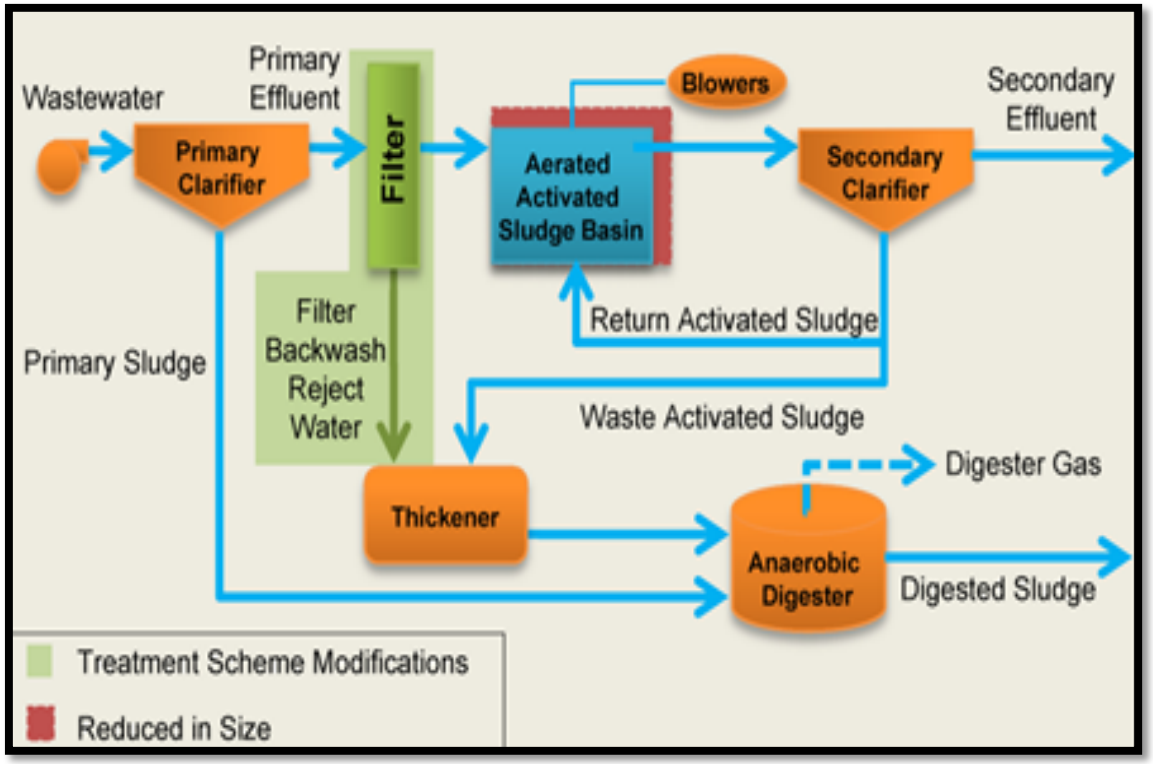
Research Investments Will Fill Key Funding Gaps

Energy Innovation Pipeline

Current Water and Energy Efficiency R&D Activities at the California Energy Commission

- Funds clean energy technologies and strategies that promote greater electricity reliability, lower costs, and increased safety.
- Projects must lead to technological advancements and breakthroughs and benefit investor-owned utility ratepayers
- Example strategic objectives
  - Develop and Test Advanced Industrial, Agriculture and Water Technologies
  - Advanced Strategies to Reduce California Building Impact on the Water Energy Nexus

Reducing Energy Use in Wastewater Treatment Plants with Filtration Systems



Linda County Wastewater Treatment Plant

- Goal: Use of primary effluent filtration system to reduce the organic content of incoming wastewater
- Reduced aeration electrical power by 20 to 30 percent
- 20 to 25 percent increase in bio gas

Municipal Wastewater Treatment RD&D

Zero Net Energy Wastewater Treatment Project

Victor Valley Wastewater Reclamation Authority

- Retrofitted and installed a novel technology to increase biogas production.
- Biogas production was also enhanced by co-digestion of oils and grease and municipal sludge.
- Produced biogas generates 1.6 MW –enough to cover all the electricity needs of the treatment plant and provide excess for sale to the grid.

CASCADE Clean Energy System for Water and Wastewater

Dublin-San Ramon Service District

- Increase methane production using customized bacteria matched to the organic content of the wastewater.

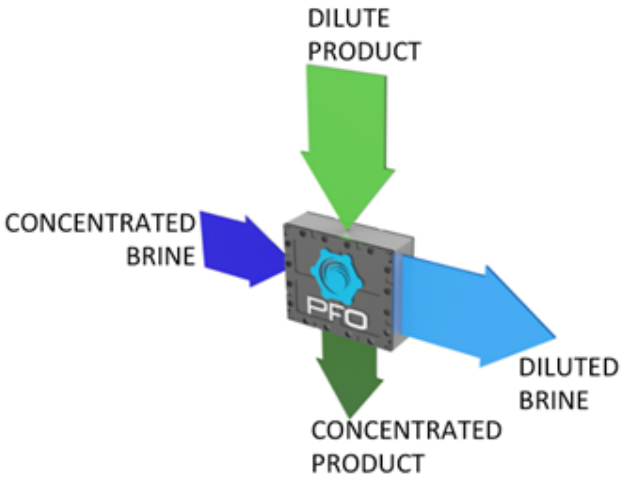
Reducing the Cost of Desalination

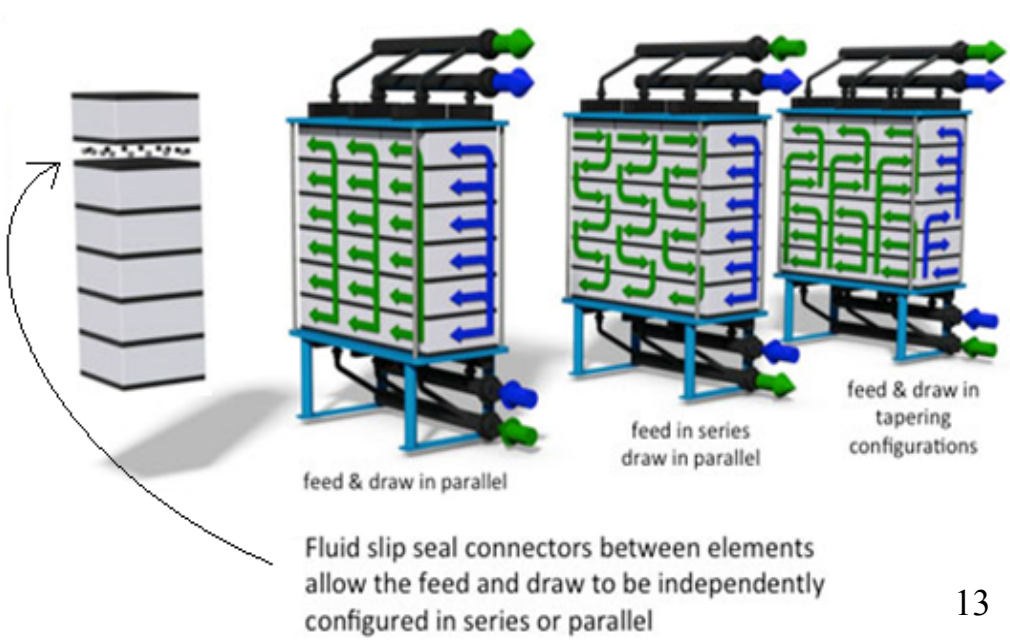
Beverly Hills Desalination Facility

- The briny discharge from a desalination plant is costly to dispose, especially for inland desalination facilities
- Goal: Demonstrate the electrodialysis technology to reduce briny discharge and energy consumption of the desalination process.
- Results are encouraging
- Larger scale applications and further demonstrations needed.

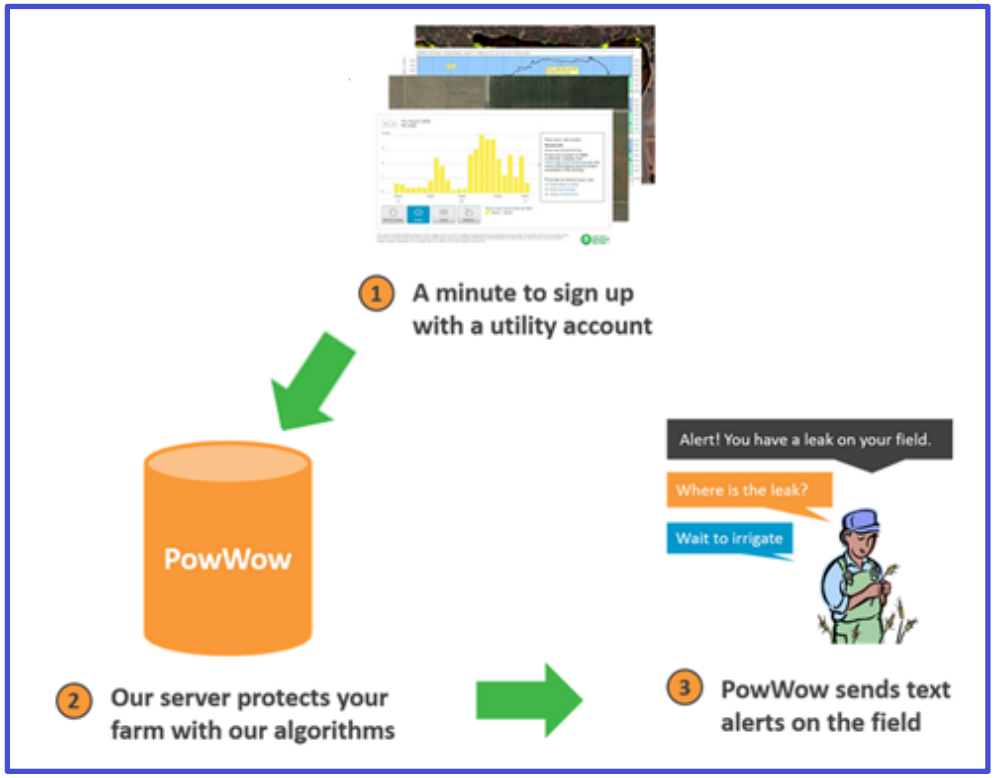
Advance Wastewater Treatment Using Forward Osmosis to Produce High Quality Water

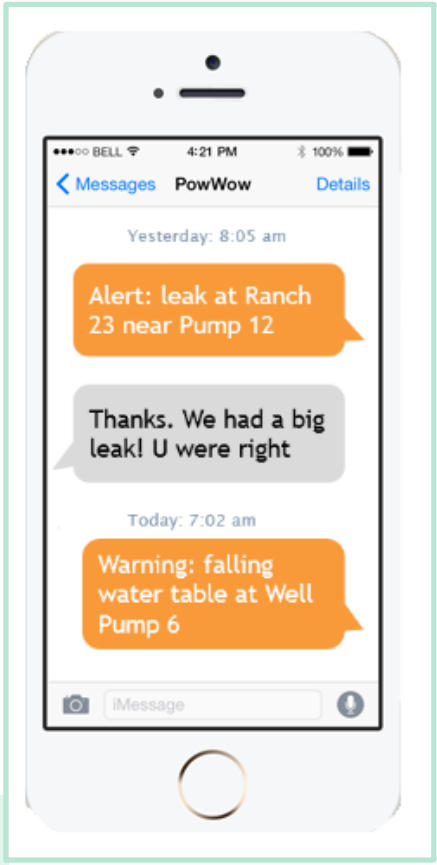
- Goal: Reduce wastewater treatment cost while producing water that can be re-used in the process
- Reverse osmosis uses hydraulic pressure to force separation of salts from a solution (high energy)
- Forward osmosis uses the pressure gradient to draw the salts outs—no pumping energy
- Potential for energy savings and water reclamation





Agriculture Related RD&D – Irrigation Optimization





- Demonstrate an analytic software tool that uses smart electric meter data to assist growers in optimizing irrigation.
- Pumping data is sent to a smart phone or other device
- Goal is demonstrate energy and water reductions while maintaining crop yields
- Potential 30% energy savings in preliminary trials.

Research to Catalyze Water End-Use Savings

Advanced Wok results in more heat transfer and eliminates water used for cooling the surface.

Infrared Tomato Peeling eliminates lye and water usage.

Tersus Laundry System which uses CO2 for washing clean room garments and other textiles.

Additional Information

- WET Program
  - WET Program website: www.energy.ca.gov/wet/
  - Idea Exchange: http://www.energy.ca.gov/wet/idea_exchange.html
- Research and Development
  - Research Overview: www.energy.ca.gov/research/
  - EPIC: www.energy.ca.gov/research/epic/
  - PIER Natural Gas: www.energy.ca.gov/contracts/pier.html
- Opportunities List Serv: www.energy.ca.gov/listservers/

Upcoming Water-Related Workshops

August 26th – Pomona, CA : WET Phase II and III

10:00 a.m.

Kellogg West Conference Center - Cal Poly Pomona

3801 West Temple Avenue Bldg #76

Pomona, CA 91768

(Free Parking Pass available at Kellogg West Conference Center)

August 28th - Sacramento, CA : Integrated Energy Policy Report Workshop : Drought Response

9:30AM – 5:00PM

CALIFORNIA ENERGY COMMISSION

1516 Ninth Street

Art Rosenfeld Hearing Room (Hearing Room A)

Sacramento, California 95814

Questions?